

Photo Enforcement at Highway-Rail Grade Crossings: 2001 Status Report to The General Assembly



Research & Analysis Section
Transportation Division

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EXECUTIVE SUMMARY:

In 1996, the General Assembly required the Commerce Commission to conduct an evaluation of the effectiveness of automated photo enforcement of traffic laws at three highway-railroad grade crossings in DuPage County. Irving Park Road in Wood Dale, River Road in Naperville, and Sunset Avenue in Winfield Township were initially selected. A fourth location, Fairview Avenue in Downers Grove, will begin operation in Summer 2002; however, Downers Grove site is not connected with ICC's mandated pilot program.

Each site employs a different type of photo enforcement technology; however all four sites function in a similar manner by recording images of a motor vehicle not complying with activated warning devices at the subject crossings. The images recorded are used as the evidentiary basis for issuing a citation to the registered owner of the vehicle. Experience through December 2001 indicates that automated enforcement is working well to discourage motorists from violating grade crossing warning devices.

At Irving Park Road in Wood Dale, a decline of 47 percent in the number of violations was achieved based on a January 2000 to September 2000 comparison. However, the City of Wood Dale ceased issuing citations in October 2000 after a decision from Associate Judge Brian McKillip, who ruled that the process used by the City of Wood Dale to issue citations was unconstitutional.

Wood Dale did not issue any citations between October 19, 2000 and May 15, 2002. They did, however, issue warnings to motorists observed violating traffic laws at the Irving Park Road grade crossing. The General Assembly enacted Public Act 92-

0245 in July 2001, which Governor George Ryan signed on August 3, 2001, revising the state statute pertaining to photo enforcement. The DuPage County state's attorney later authorized the Wood Dale police to resume issuing citations in Spring 2002 and the police department resumed issuing citations in May 2002.

At River Road in Naperville between June 2000, when 315 vehicles were observed violating grade crossing traffic laws, and December 2001, when 41 violations were observed, there has been an 87 percent reduction in the number of violations per month. Naperville issues citations under local ordinance and was not affected by Judge McKillip's decision.

The third photo enforcement site is located at Sunset Avenue in Winfield Township. Assurance testing was completed in October 2001. However, the Sheriff's office did not issue any citations in 2001. The DuPage County Sheriff's office anticipates issuing citations in May 2002.

The General Assembly enacted Public Act 92-0098 in July 2001, which permitted additional photo enforcement sites to be created in DuPage County as long as they were installed at no expense to the State. Downers Grove is the only community to take advantage of this opportunity as of May 2002. The Village is constructing a system at Fairview Avenue along the Burlington Northern Santa Fe Railway. This site was under construction as of April 2002. The Village plans to begin collecting baseline violation rates in Summer 2002 with enforcement to begin shortly thereafter.

While photo enforcement installations are effective at deterring violations, they are

also expensive to install and maintain. The average per crossing cost to install and operate the three sites for two years is approximately \$314,105. Additional costs are incurred by the local police departments in providing staff to process citations and by the court system in adjudicating the cases brought before the Court.

Photo enforcement of traffic laws at grade crossings is an effective tool to reduce violations and collisions, thereby preventing injuries and fatalities. While photo enforcement has proven its ability to deter violations, the current cost of the installations is a substantial impediment to

their use statewide. Photo enforcement is likely to be implemented only at selected high-risk locations that have a history of collisions and only after an engineering analysis has concluded that photo enforcement is appropriate.

This report provides a summary of the effectiveness of the Commission's photo enforcement pilot program through December 2001. The development and performance of each site is briefly discussed and a comparison of the effectiveness of each site is made. The Table below provides a summary of each location.

Site	Date Operational	Months of Operation as of Dec. 2001	Construction Cost	Cost of 24 Months of Maint.	Total Cost	Citations Issued	Guilty Decisions	Revenue as of Dec. 2001
Downers Grove	Summer 2002	0	Not Avail.	Not Avail.	Not Avail.	Not Appl.	Not Appl.	Not Appl.
Naperville	July 2000	18	\$277,000	\$19,200	\$296,200	719	635	\$129,715
Winfield	May 2002	0	\$265,350	\$78,766	\$344,116	0	0	\$0
Wood Dale	December 1999	11	\$110,000	\$192,000	\$302,000	762	355	\$120,095
Total		29	\$652,350	\$289,966	\$942,316	1,481	990	\$249,810

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1.0 INTRODUCTION:

Public Act 89-454, passed in 1996, required the Illinois Commerce Commission (Commission) to conduct a two-year pilot program to test the effectiveness of automated photo enforcement of traffic laws to detect and deter grade crossing violations.

The General Assembly required the test to be conducted in cooperation with Metra, the Commuter Rail Service Board of the Regional Transportation Authority (RTA) of northeastern Illinois, and local law enforcement agencies and that the program occur in DuPage County. Three locations were initially selected based upon a collision frequency analysis conducted by the Railroad Safety Section of the Transportation Division:

- * Irving Park Road in the City of Wood Dale;
- * River Road in the City of Naperville; and,
- * Sunset Avenue in Winfield Township.

A fourth site; Fairview Avenue in the Village of Downers Grove was added in 2002.

All four locations are testing photo enforcement as the means of providing automated enforcement. Each location is testing a slightly different type of photo enforcement system. Wood Dale is using a system from ACS State and Local Solutions (formerly Lockheed Martin IMS); Naperville is using a system from Science Applications International Corporation (SAIC); DuPage County is using a system from Nestor Traffic Systems at the Winfield Township location; and Downers Grove is using a system installed by Proscan.

All four systems apply essentially the same process in that a camera records apparent violations and the frames of film are automatically reviewed by specialized software to recognize violations. Once a violation has been recognized, the cooperating police department uses software to review the violations to determine which violations should receive a citation. Citations are then generated automatically by custom software and sent to the registered vehicle owner. The only significant difference between the technologies employed at the four sites is that Wood Dale's system from ACS State and Local Solutions (ACS) uses traditional "wet" 35mm film to record potential violations, which are then digitized, whereas the other three sites are using completely digital technology.

With a December 8, 1999, activation Wood Dale was the first site to come on-line. Between December 8, 1999, and October 18, 2000, the Wood Dale Police Department issued 762 citations. Wood Dale ceased issuing citations on October 18, 2000, following Associate Judge Brian McKillip's decision finding that the process used by the police department to issue citations was unconstitutional. Wood Dale issued warnings to motorists between November 2000 and April 2002. As a result of legislation passed by the General Assembly, Wood Dale resumed issuing citations in May 2002.

River Road in Naperville was the second site to become active, going live in July 2000. Between July 1 and December 31, 2001, the Naperville Police Department issued 719 citations with a 98.5 percent guilty rate of dispositions for the 635

citations which had made it through the judicial process as of April 2002.

Sunset Avenue in Winfield Township in unincorporated DuPage County collected baseline violation data in April 2001, but has not used the site to issue citations. The DuPage County Sheriff's office is responsible for the enforcement of traffic laws at this location in unincorporated DuPage County. The Sheriff's office will begin issuing citations in May 2002.

The photo enforcement system at the Fairview Avenue grade crossing in Downers Grove was under construction as of April 2002. Construction is scheduled to be

completed in May 2002. Baseline violations at the site will be recorded for a 30-day period and enforcement will begin in Summer 2002.

The remainder of this report provides a summary of the operations of the first three sites through December 2001 and a discussion of the development of the Downers Grove site. Additional information concerning the development of the first three sites is available in Transportation Division Working Paper 2001-01, published in May 2001 and available at the ICC Web site www.icc.state.il.us.

2.0 BACKGROUND:

Use of photo enforcement in the U.S. is slowly growing. As of November 2001, photo enforcement was being used in 60 communities throughout the U.S. in 13 states.⁽¹⁾ Photo enforcement and video surveillance are primarily used in toll collection, freeway-operations management and red-light-running applications. Video enforcement at highway-rail grade crossings is also growing with six states currently authorizing use at highway-rail grade crossings: Arkansas, California, Illinois, Iowa, North Carolina, and Texas.⁽²⁾

Experience at red-light-running sites has indicated a reduction of crashes of approximately 40 percent once cameras have been introduced. "Red-light cameras provide the certainty of enforcement, 24 hours a day, 7 days a week. This has changed the way drivers behave with regard to red-light running, and now we know the behavior change is affecting the bottom line, which is crash likelihood. With the well publicized use of photo enforcement, communities can substantially reduce the

number of crashes and injuries that occur at busy intersections."⁽¹⁾

Illinois Vehicle Code Section 11-1201.1 (a) requires that a photo enforcement system perform the following functions:

- * Obtain a clear image or photograph of the vehicle,
- * Obtain a clear image or photograph of the driver of the vehicle,
- * Obtain a clear image or photograph of the vehicle registration plate, and
- * Record the time, date and location of the violation.

If all the criteria identified above have been met, then the local law enforcement agency responsible for enforcement of traffic laws at that location may issue a uniform traffic citation accompanied with a written document which explains the alleged violator's rights and obligations and how the alleged violator can elect to proceed by

either paying the fine or challenging the issuance of the uniform traffic citation. Railroad crossings equipped with automatic enforcement systems must have signs posted indicating that the grade crossing is under surveillance, and that citations will be issued and the amount of the fine.

Photo enforcement is relatively straightforward in terms of implementation. Once a train has activated the grade crossing warning device, the cameras become active and will record images of any vehicle entering the crossing once the gates have begun to descend. Once an image has been recorded, it is sent to a central location for processing and reviewed to determine if a violation has occurred. The Naperville and Wood Dale police departments allow a delay of five seconds after the flashing lights have activated before the issuance of a citation. The review can be accomplished manually,

or by applying computer software to automatically recognize when a violation occurs. Once a violation has been identified, further review is necessary to verify that the requirements for issuing a citation have been met.

In order to issue a citation, the vehicle must be registered to a non-corporate owner who resides in Illinois. The driver of the vehicle is the person whom the citation is intended to reach, however since only the registered owner of the vehicle is public knowledge, the citation is addressed to the registered owner. If the registered owner was not the driver when the violation occurred, the registered owner simply has to return the citation or appear in court and indicate that he or she was not the driver and the citation will be dismissed. The registered owner is required to indicate who was driving the vehicle at the time, if known.

3.0 IRVING PARK ROAD IN THE CITY OF WOOD DALE

Irving Park Road in the City of Wood Dale was the first installation to come on-line with full system activation occurring on December 8, 1999. This grade crossing is located on Metra's Milwaukee West Line to Elgin and has approximately 75 trains per day of which 58 are Metra commuter trains. There is an average annual daily traffic (AADT) count of 32,000 vehicles on Irving Park Road, which is a divided four lane state highway.

The Wood Dale site utilizes a system from ACS that employs traditional "wet" 35-

millimeter film. The film is retrieved from the camera installations on a regular basis and developed by ACS technicians. Once the film has been developed it is digitized by ACS and automatically reviewed by its staff. ACS then forwards to the Wood Dale Police Department all clear violations for final review. The Department then issues a citation to the registered owner of the vehicle photographed. Figure 2 provides a general overview of the Irving Park Road site.

Figure 2. Irving Park Road in Wood Dale, Illinois looking east.



This installation is unique in that only the two westbound traffic lanes are under surveillance. The two eastbound traffic lanes are not monitored because eastbound traffic is effectively controlled by a four-way signalized intersection with Wood Dale Road, 362 feet to the west.

Wood Dale is also unique in that the City has recently constructed a bypass lane that allows traffic, which is heading west on Irving Park Road and wishes to turn north

onto Wood Dale Road, to exit onto the bypass lane just prior to reaching the grade crossing on Irving Park Road. This traffic thus avoids both grade crossings on Irving Park Road and Wood Dale Road. The bypass lane eliminates many trips that once had to cross both grade crossings as well as the four-way signalized intersection of Irving Park Road and Wood Dale Road.

Figure 3 provides an illustration of the camera installations in use at Wood Dale.

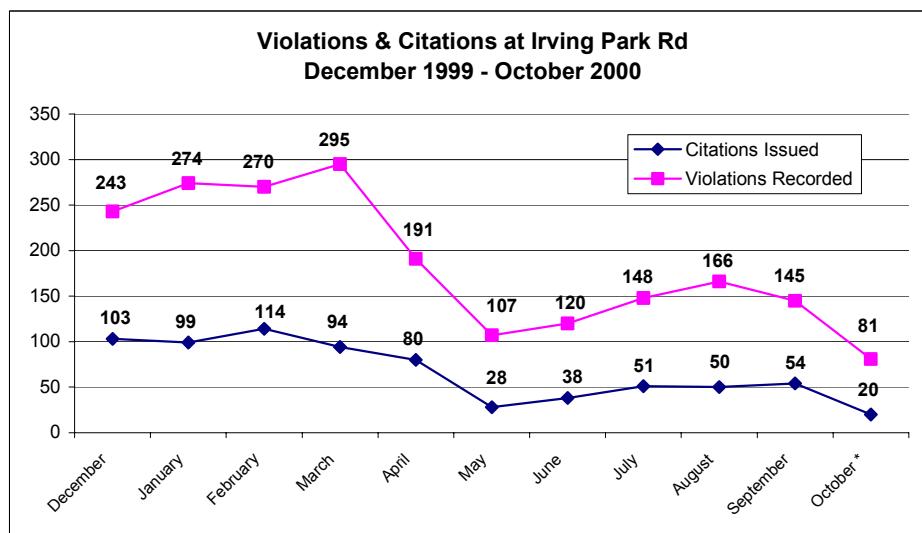


Figure 3. Wood Dale Photo System.

3.1 RECAP OF 1999 AND 2000 OPERATIONS

Figure 4 summarizes the number of violations and citations issued between December 8, 1999, and October 21, 2000. Please note that the number of violations

and citations for December 1999 and October 2000 are not for the complete month.



There were 274 violations in January 2000, which was the first full month of operation at this site and 145 violations recorded in September 2000, which was the last full month the site was in operation. This represents a decline of 47 percent in the number of violations per month. The Federal Railroad Administration (FRA)

proposed rule requiring horn sounding at all public at-grade crossings requires that photo enforcement installations maintain a 49 percent reduction, or greater, in the occurrence of violations from the baseline violation rate in order to maintain a quiet zone. A strict interpretation of the effectiveness of Wood Dale in deterring

violations would mean that this site is not maintaining the effectiveness threshold that FRA may require if the final rule requiring train horns is adopted as published.

During 2000, according to both ACS and the Wood Dale Police Department, “there have been no mechanical failures from the system, however due to a few film jams in one or both of the cameras there was a cumulative downtime of approximately nine days” providing an overall availability level of 97 percent between December 1999 and December 2000. There was only one documented occurrence of a gate malfunction during this period. Unfortunately, the Irving Park Road site experienced a substantial procedural problem in 2000.

3.2 OPERATIONS IN 2001

In 2001, Wood Dale’s site was not used to issue citations because of Judge McKillip’s October 2000 ruling. In order to remedy the deficiencies outlined by Judge McKillip, Public Act 92-0245 was enacted in August 2001. The new Act made seven significant changes to the existing state statute; two of which directly addressed the deficiencies identified by Judge McKillip and five additional changes that modified other portions of the law.

The two changes that were necessary to permit photo enforcement to be resumed at Wood Dale were to explicitly state the language that should be included in the accompanying notice and to state that photos were admissible as long as the cameras used to record images were certified as being in good working order at the beginning and end of each day.

On October 18, 2000, Associate Judge Brian R. McKillip of the Eighteenth Judicial Circuit, DuPage County issued a ruling finding two significant flaws with the photo enforcement process being used at Wood Dale. The two flaws in Judge McKillip’s opinion are that the citation and accompanying notice informing recipients of their rights and responsibilities is insufficient and that the procedure for admitting digital images into evidence is not sufficient.

Because of Judge McKillip’s ruling, the Wood Dale Police Department stopped issuing citations in October 2000 and instead issued warnings to motorists who were observed in apparent violation of traffic laws at this location.

Other changes made by Public Act 92-0245 included changing the fine structure so that a \$250 fine is required for a first offense instead of \$500, and to require a \$500 fine for a second offense. The use of community service was removed as an option as well. In addition, for a second offense, the secretary of state’s office may suspend the registration of the motor vehicle for at least six months.

Public Act 92-0245 also explicitly directed corporate authorities to use the same penalty system outlined above. The duration of the pilot program was also changed from two years to five years. Finally, the Act stated that if any portion of the statute is later found to be unconstitutional, the remainder of the statute shall remain in force since that was the intent of the General Assembly.

One interpretation of the duration of the pilot program is that the program will run

for five years at each site beginning with the initiation of enforcement activities. In the case of Wood Dale, this period will run from December 8, 1999, through December 7, 2004. The Commission will prepare an annual report summarizing the effectiveness of the program for the duration of the pilot program.

Wood Dale did not resume issuing citations in 2001. In Spring 2002, the Village worked with the DuPage County State's Attorney to revise the accompanying notice as specified in Public Act 92-0245 and on April 15,

2002, began a 30-day test period to ensure that the site is functioning properly. The Village also entered into a new agreement with ACS to maintain the site since the two-year period in which the State was to pay for maintenance had expired. The monthly maintenance agreement is \$8,000 per month and can be voided if the Court should find any further problems with the photo enforcement program which would prohibit Wood Dale from being able to issue citations. The Village hopes to resume issuing citations in May 2002.

4.0 RIVER ROAD IN THE CITY OF NAPERVILLE

River Road was the second installation to come on line, with baseline violation rates being captured in May and June of 2000 and full activation in July 2000. The River Road site is using a completely digital system from Science Applications International (SAIC). River Road at Naperville is on

Metra's BNSF Line to Aurora. The grade crossing has approximately 147 daily trains with an average daily traffic count of 9,100 vehicles on River Road, which is a local street. Figure 5 provides a general overview of the River Road site.

Figure 5. River Road in Naperville, Illinois looking south before the installation of the cameras.



The photo enforcement process utilized by SAIC at Naperville is somewhat similar to the process implemented by ACS at Wood Dale. The most notable difference between the two sites is that the Irving Park Road location at Wood Dale is monitoring only one direction of travel (westbound), whereas the River Road site is monitoring both directions of travel (north and south). A second difference is in the technology used to record images. Wood Dale uses a traditional 35 mm camera with “wet” film,

whereas the River Road site is using a digital camera, supplemented with a digital video camera, to record violations.

Digital images are transmitted directly to a dedicated workstation at the Naperville Police Department, where they are reviewed by the officer responsible for Naperville’s photo enforcement program. Figure 6 provides an illustration of the cameras in use at Naperville.



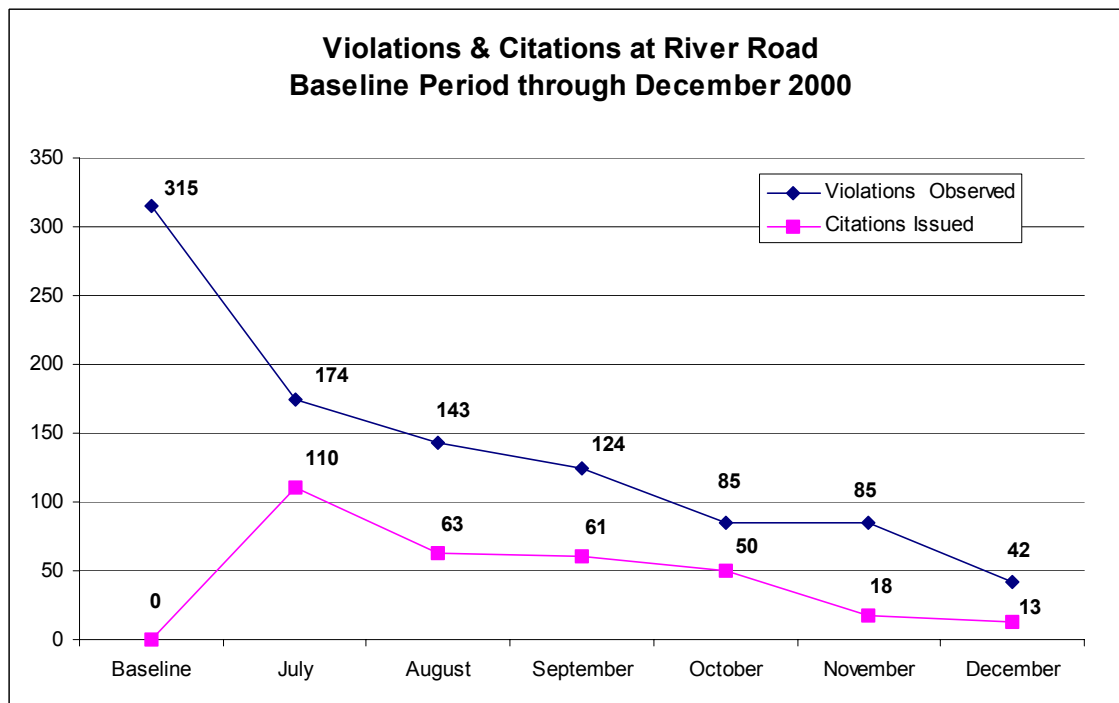
Figure 6. Camera installations at River Road.

4.1 RECAP OF 2000 OPERATIONS

Figure 7 graphically illustrates the decline in the number of monthly violations achieved by the photo enforcement system in 2000. November and December data under-represents the number of true violations due to mechanical problems with the lighting in November and snow in December. The decline in the number of violations between

the number of violations recorded in the 30-day baseline violation period of June of 315 and October’s level of 85 violations, is 73 percent. Naperville would meet the FRA’s effectiveness threshold of 49 percent if the final rule requiring train horn sounding is published as proposed.

Figure 7. Violations and citations at River Road Baseline period (June) - December 2000.



Note: No citations were issued during the 30 day baseline violation data collection period.

River Road experienced mechanical problems in November and December 2000. In November, the lights used to provide supplemental illumination failed; and in December, Naperville's cameras experienced a build up of condensation in the cameras which impaired the effectiveness of the cameras in capturing high quality images. The camera housings are filled with an inert gas and, during December, the inert gas leaked out and

moisture seeped into the camera housing. Once temperatures fell below freezing, the moisture within the housing froze and obscured the digital images being produced. A substantial number of the violations observed in November and December could not be prosecuted due to poor quality images. Overall, the availability rate of the Naperville site for 2000 is estimated to be 83 percent.

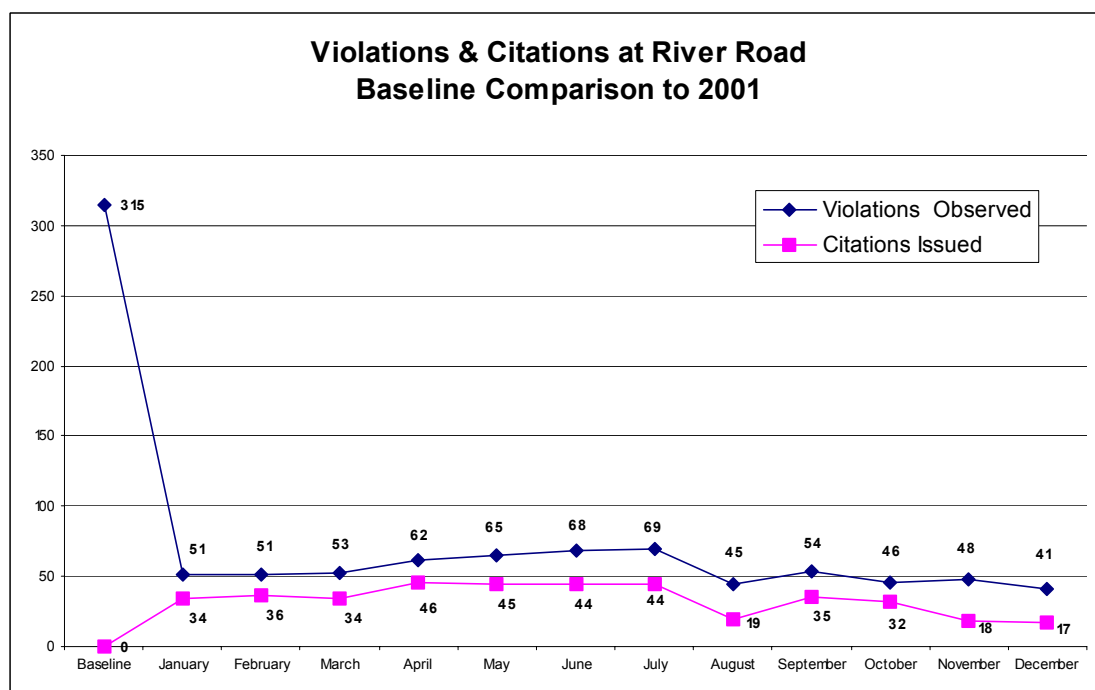
4.2 OPERATIONS IN 2001

Naperville issues citations through a local ordinance which complements the state statute and was not affected by Judge McKillip's ruling. Naperville immediately made the change in the accompanying notice to provide additional information to the recipient of the uniform traffic citation so that they were clearly aware of their rights and responsibilities in responding to the citation. The officer in charge of Naperville's program also brings the entire computer installation to the court proceeding so the Judge who handles Naperville's cases

has never had any issues with the use of photographic evidence.

In 2001, Naperville achieved an even greater compliance to the grade crossing traffic law than in 2000 by attaining an 87 percent reduction in the number of violations from the 315 per month, which were recorded during the baseline data collection period in June 2000, to 41 violations recorded in December 2001. Figure 8 below presents a graphic illustration of the success of Naperville's photo enforcement program in 2001.

Figure 8. 2001 Photo enforcement results.



Note: No citations were issued during the 30 day baseline violation data collection period.

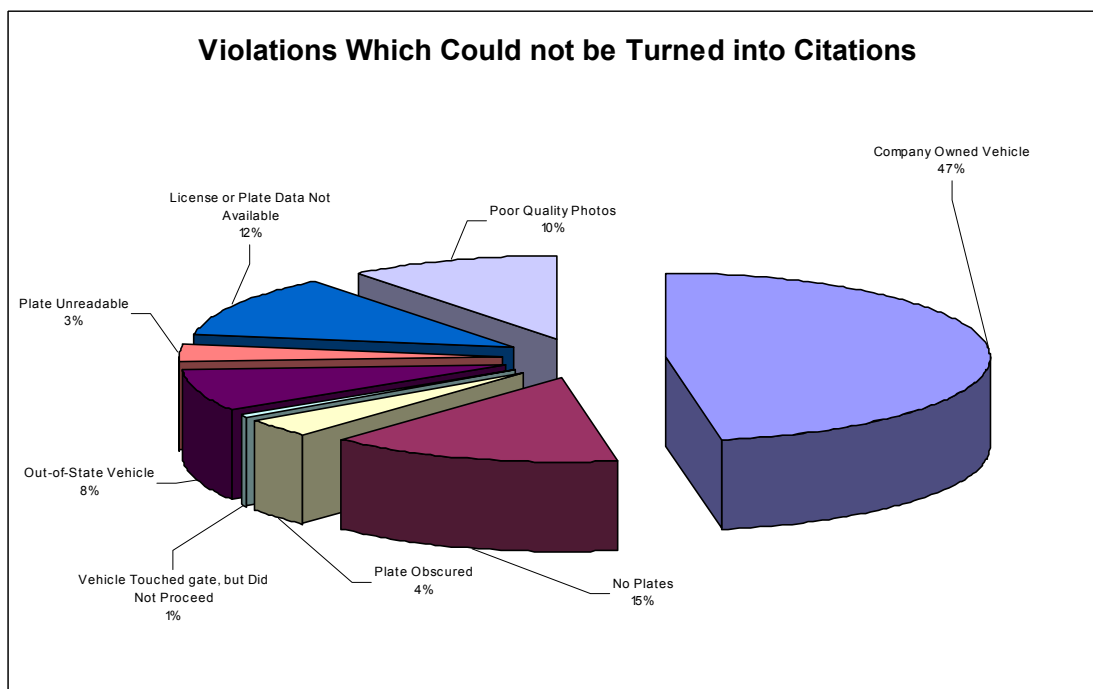
Not all violations that are observed can be turned into citations. Vehicles registered to corporations or to out-of-state owners can not be prosecuted since the police department can not obtain the required information in which to issue a citation.

Likewise, environmental conditions and mechanical problems with the cameras may also prevent the police department from issuing a citation to the vehicle's registered owner. A total of 1,306 violations were observed between July 2000 and December

2001. Of these, 719 received citations and 587 apparent violations (45 percent) could not be turned into citations. Fifty-nine percent of such cases were because the vehicle was registered to a corporate owner or because the data was not available to process the violation within the 30-day time period specified in the statute. Only 10

percent of the cases can be attributed to poor quality photos. Figure 9 illustrates the role that the various administrative, environmental and mechanical variables played in preventing the Naperville Police Department in issuing citations to all observed violators.

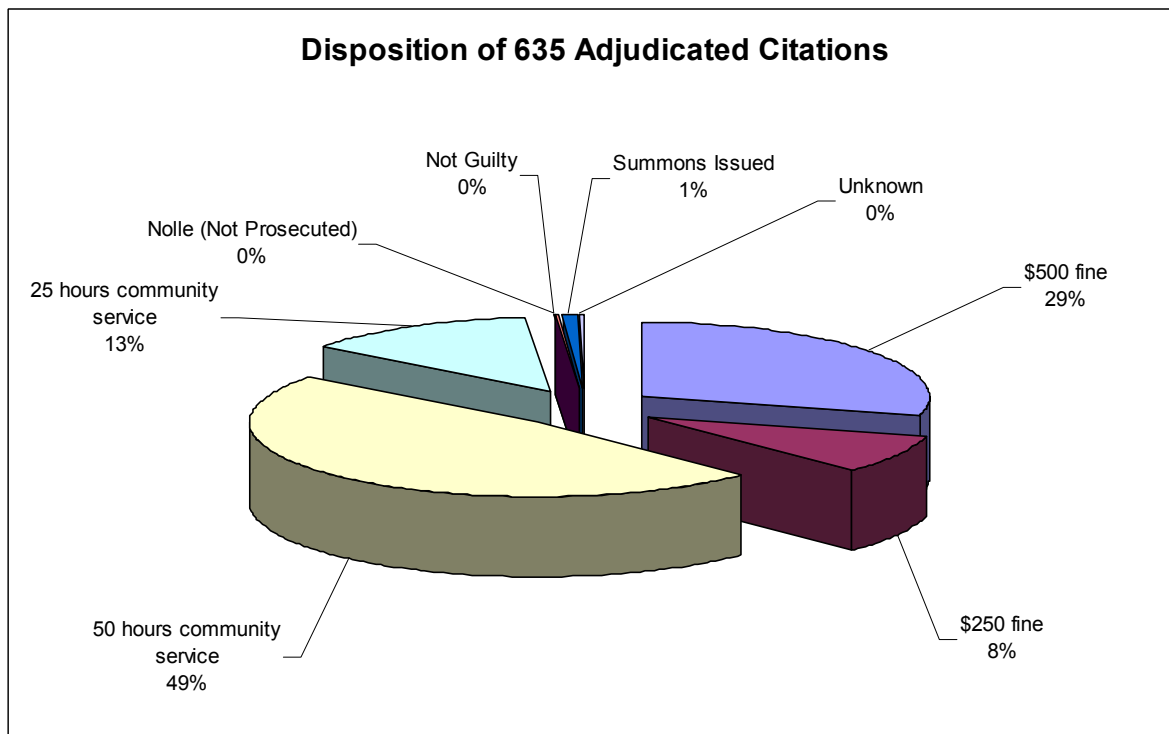
Figure 9. Reasons why not all violations are turned into citations.



In 2001, Naperville was impacted by Public Act 92-0245, which changed the nature of the penalty that can be implemented for those found guilty of violating grade crossing traffic laws. Naperville reduced the amount of the fine for first time offenders to \$250 as required by the revised statute. However, Naperville continued to implement community service as a penalty even after community service had been removed as one of the permissible penalties

As of April 2002, 635 of the 719 citations issued had made their way through the judicial system. Of the 635 citations processed, 626 resulted in a guilty decision (98.5 percent), one citation was not prosecuted, six individuals did not appear for their court date and a summons was issued and only one citation received a not guilty decision. Figure 10 provides a summary of the penalties imposed.

Figure 10. Disposition of citations.



Naperville's site cost approximately \$296,200 to construct and operate for two years, which was paid for out of the Commission's Grade Crossing Protection Fund. The monthly maintenance cost is approximately \$800, which means that the physical construction of the site cost approximately \$277,000. During this time, the site has generated approximately \$23,715 in court costs and an additional \$106,000 in fines for a total revenue of \$129,715 to offset the capital and maintenance costs.

Considering Naperville's preference of using community service as a penalty and the reduction of the fine to \$250 for a first time offense, it will take four to five years of operation for the installation to recover its construction and maintenance costs through the fees and fines collected.

On July 1, 2002, the site will have been in service for two years. Once the site is two years old, the Commission no longer is required to pay the monthly maintenance cost and the City will have to enter into a contract with SAIC or another vendor to perform routine physical maintenance at the site. However, the City performs most of the operation and maintenance of the site with its own staff so it is able to keep the cash cost of operation and maintenance very low.

The nature of the site's equipment in being entirely digital, also contributes to a low monthly maintenance cost as compared to Wood Dale's monthly maintenance fee of \$8,000. One officer is dedicated to processing the violations and handling the court cases and spends as much as 20 percent of his regular work week handling the site.

5.0 SUNSET AVENUE IN UNINCORPORATED DUPAGE COUNTY

The third photo enforcement site is at Sunset Avenue in unincorporated Winfield Township. Sunset Avenue is on Metra's UP West Line to Geneva. The grade crossing has 110 trains per day, with 58 of these being Metra trains. Approximately 300 vehicles per day use this crossing to access a residential subdivision.

The Sunset Avenue site uses a completely digital surveillance system from Nestor Traffic Systems. Both directions of travel are under surveillance at this location. The surveillance system from Nestor uses two digital cameras to capture images of the license plate and driver. Figure 11 provides a photo of the location.

Figure 11. Sunset Avenue in Winfield Township looking south before the installation of the cameras.



Construction of the Sunset Avenue site was completed in February 2001. Construction of this site cost approximately \$265,300 and the monthly maintenance fee is approximately \$3,300. Figure 12 provides

an example of the camera installation at Sunset Avenue. The camera is located in the circular enclosure that hangs beneath the auxiliary spotlight.

Figure 12. Camera installation at Sunset Avenue.



5.1 OPERATIONS IN 2001

The County did not use the site in 2001 because of concerns over the constitutionality of the law that Judge McKillip had pointed out in October 2000.

Baseline violation data was acquired between April 1 and May 5, 2001. During the first 15-day period one vehicle was observed violating the grade crossing traffic laws. During the second 15-day period, after the press release and installation of warning signs, no vehicles were observed violating the grade crossing traffic laws. For analytical purposes, the site's record of baseline violations is one violation during the required 30-day baseline violation data collection period. This will make maintaining a 49 percent or greater reduction in subsequent violations very difficult in the future since all it will take is one violation to place the site out of the effectiveness bounds which FRA's proposed horn rule requires.

As of April 2002, the Sheriff's office was working to revise the notice that accompanies the uniform traffic citation. The Sheriff's office also indicated that they would need some refresher training to

refamiliarize them with the automated citation writing software that Nestor Traffic System provided as part of the installation. The Sheriff's office anticipates using the site for enforcement purposes in the summer of 2002.

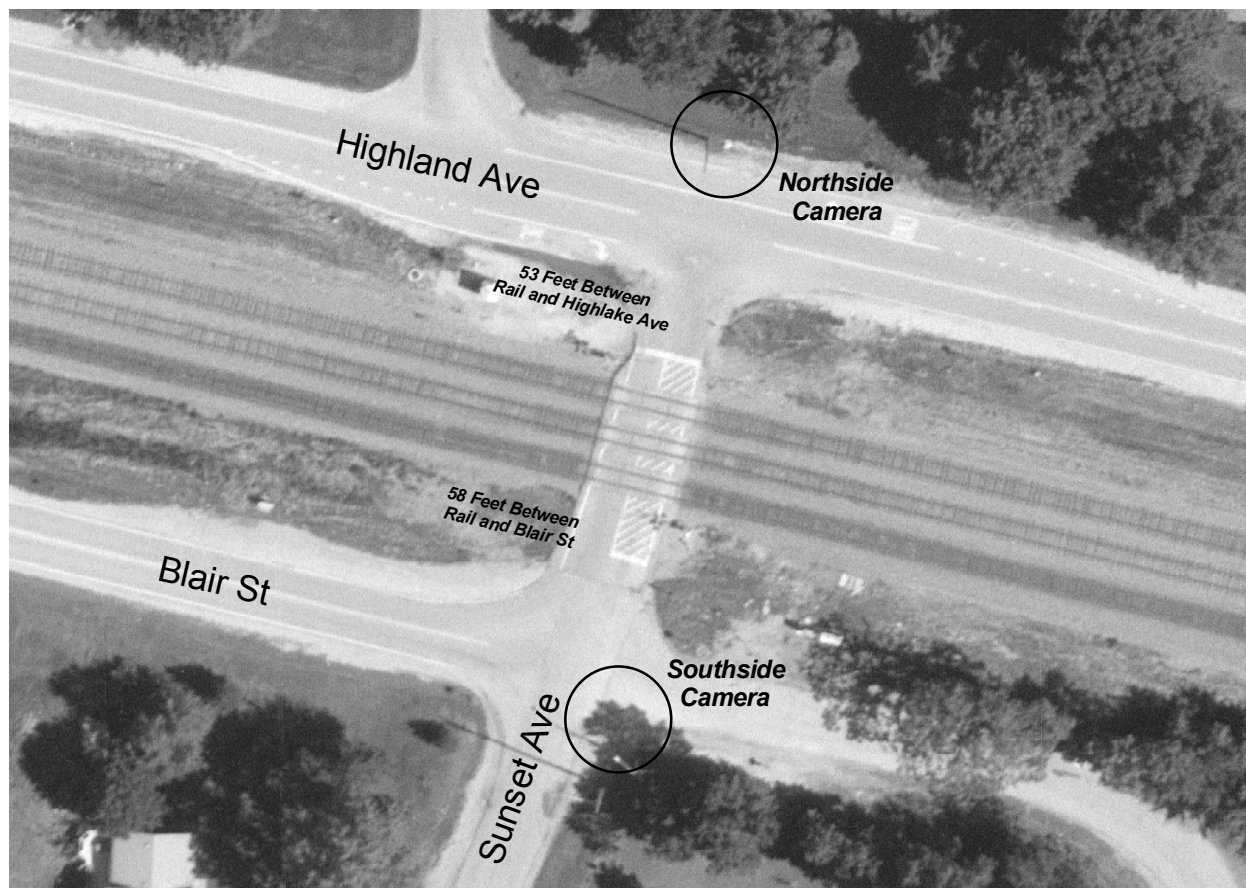
A number of valuable lessons have been learned from the Sunset Avenue site even without actually implementing its full capabilities. In terms of project management, Nestor Traffic Systems felt that having one point of contact would have simplified some management and construction issues. In the case of Sunset Avenue, the DuPage County Department of Transportation was the agency that let the contract and supervised installation of the site, rather than the Sheriff's office, which will be using the site. The police departments at Naperville and Wood Dale are the principal points of contact for those sites.

The limited space which a vehicle can occupy while traveling over the crossing and the elevated profile of the Sunset Avenue grade crossing, make obtaining valid images across all vehicle types very difficult to

obtain. There are parallel roads running east west along the railroad tracks that turn at a 90-degree angle across the tracks on Sunset Avenue. The two parallel roads are only about 50 feet from the near edge of the closest rail, so there is very little distance for a camera to focus on the vehicle and obtain the three required images of the vehicle, the driver's face, and the registration plate. The

elevated profile of the crossing also makes it difficult for a camera to focus on the driver since the height of the windshield above the pavement and the angle of the windshield in regards to the camera, are constantly changing. Figure 13 provides an aerial view of the crossing illustrating the problems with the adjacent roads and limited space available in which to obtain images.

Figure 13. Aerial view of Sunset Avenue grade crossing.



The cost to construct the Sunset Avenue installation was \$247,850 with an additional \$17,500 for a backup power generator to ensure that the site was available in the event of a power outage. The annual cost for maintenance is \$39,383, or \$3,282 per month. The total cost for installation, backup power supply and two years of maintenance was \$344,166, which was paid

for out of the Commission's Grade Crossing Protection Fund.

The Sunset Avenue site was a custom designed site that did not use "off-the-shelf" technology. Between August 1 and December 31, 2001, the site was down due to a computer hard drive failure which caused an extensive loss of configuration

data, the need to replace the two digital cameras and a recurring problem with the computer server located at the Sheriff's office.

Nestor Traffic Systems also encountered several problems in the construction phase. Steel poles could not be obtained in a timely manner so wooden poles were used which later needed to be replaced once the steel poles arrived. The software also had some difficulties in discerning train movements from vehicle movements, which led to the need for Nestor Traffic Systems to manually screen violations.

An invaluable lesson learned at this location is that in the future it is important to conduct a pre-implementation traffic study to gauge the quantity and nature of existing traffic law violations. With an average annual daily traffic count of 300 vehicles and only one observed traffic law violation during the 30-day baseline period, this site will not generate a large enough volume of violations to accurately evaluate the performance of the photo enforcement installation at this location.

6.0 FAIRVIEW AVENUE IN THE VILLAGE OF DOWNERS GROVE

The fourth and final photo enforcement site is at Fairview Avenue in the Village of Downers Grove. The Downers Grove site was made possible in August of 2001 when Public Act 92-0098 was enacted by the General Assembly that permitted other communities in DuPage County to establish additional photo enforcement sites. The additional sites are to be constructed in cooperation with Metra and may not use any State funds for construction or operation. As of May 2002, only Downers Grove has taken advantage of this opportunity.

Fairview Avenue is on Metra's BNSF Line to Aurora. The grade crossing has approximately 150 trains per day, with 65 of

these being Metra trains along with six daily Amtrak trains. Approximately 13,400 vehicles per day use this four lane urban arterial. A Metra station is adjacent to this grade crossing.

The Fairview Avenue site uses a completely digital surveillance system from Proscan Technologies. Both directions of travel are under surveillance at this location. The surveillance system from Proscan uses two digital cameras on each side of the crossing to capture images of the license plate and driver and then sends the images to the Downers Grove Police Department for review and the issuance of citations. Figure 14 provides a photo of the location.

Figure 14. Fairview Avenue in Downers Grove looking north during the installation of the cameras.



As of April 2002, the site was under construction. The poles have been installed and the camera installation on the north side of the grade crossing is in place, but not wired to the control cabinet that is also located on the north side control cabinet. This location is unique in that the device is totally isolated from the grade crossing

warning devices and does not rely on a trigger signal from the grade crossing warning device to initiate recording. Instead, the system relies on observing that the flashing lights have initiated and begins recording with this prompt. Figure 15 provides a photo of the camera installation.

Figure 15. Camera installation on north side of the grade crossing.



7.0 SUMMARY:

Photo enforcement of traffic laws is a relatively new technology that has not been implemented on a national level. As of November 2001, thirteen states have implemented photo enforcement programs. Only six states; Arkansas, California, Illinois, Iowa, North Carolina and Texas, currently utilize photo enforcement at highway-rail grade crossings.

Each of the four sites in DuPage County were custom installations utilizing sophisticated computer processes to record apparent violations, automatically review the apparent violations and then use custom citation writing software to complete the process.

Once the sites were constructed, they have experienced few mechanical problems. Overall, Wood Dale's site has been available and working 98 percent of the time (377 days out of 386 days), while Naperville's site has been in good working order 95 percent of the time (485 days out of 515). However, Sunset Avenue was out-of-service for approximately five months of the eight months it could have been issuing

citations from a functional perspective, yielding an estimated availability rate of just 38 percent.

The most significant problem encountered has not been mechanical but procedural. Judge McKillip's October 18, 2000 decision blocked prosecution of apparent violations at Wood Dale. As a result, Wood Dale, which issued over 700 citations between December 1999 and October 2000, was forced to put their program on hold from October 19, 2000 through May 2002.

Public Act 92-0245 was enacted in August 2001 and remedied the deficiencies identified by Judge McKillip. The Act stated the language that was to be used on the notice that accompanies the uniform traffic citation and indicated that photographic evidence is admissible as long as the cameras used to record the images, have been certified as being in good working order at the beginning and end of each day. The Act also changed the fine structure and provided the secretary of state's office with the ability to suspend the

vehicle registration of anyone convicted of a second offense.

Public Act 92-0098 was also enacted by the General Assembly in 2001. This Act permitted the construction of additional photo enforcement sites in DuPage County as long as no State funds were used to construct or maintain the additional sites. As of April 2002, only the Village of Downers Grove has taken advantage of this opportunity by constructing a site at Fairview Avenue.

Photo enforcement has been very effective in reducing the rate of violations. The River Road site in Naperville has achieved an 87 percent reduction in the number of violations between July 2000 and December 2001. Wood Dale had achieved a 47 percent reduction in the number of violations between December 1999 and October 2000, when it ceased issuing citations. The

effectiveness of the sites at Sunset Avenue and at Fairview Avenue in Downers Grove have yet to be determined.

Photo enforcement installations are expensive to install and maintain. Table 1 indicates that the minimum cost to install and maintain a single installation for two years is \$296,200 with the maximum cost being \$344,116. FRA's proposed rule requiring horn sounding at all public grade crossings indicates that communities may utilize photo enforcement as a supplemental safety measure when designing quiet zones. One scenario suggested by FRA envisions a set up of four installations with one camera rotating between the four installations. Given that the average cost of the three pilot installations is \$314,000, a community would need to invest approximately \$1.2 million to construct and operate a four-camera installation.

Table 1. Effectiveness comparison.

Site	Date Operational	Months of Operation as of Dec. 2001	Construction Cost	Cost of 24 Months of Maint.	Total Cost	Citations Issued	Guilty Decisions	Revenue as of Dec. 2001
Downers Grove	Summer 2002	0	Not Avail.	Not Avail.	Not Avail.	Not Appl.	Not Appl.	Not Appl.
Naperville	July 2000	18	\$277,000	\$19,200	\$296,200	719	635	\$129,715
Winfield	May 2002	0	\$265,350	\$78,766	\$344,116	0	0	\$0
Wood Dale	December 1999	11	\$110,000	\$192,000	\$302,000	762	355	\$120,095
Total		29	\$652,350	\$289,966	\$942,316	1,481	990	\$249,810

The local police departments also incur costs to operate a photo enforcement site. The Naperville and Wood Dale police departments both indicated that they devote approximately one full day per week to process citations and to appear in court. Naperville has one officer responsible for the operation of their site who is assisted by one technician. Wood Dale has trained five officers to use their system.

Photo enforcement installations appear to have the potential to pay for themselves. Wood Dale has issued approximately \$120,000 in fines over the eleven months the site was active. Naperville has issued a total of \$129,715 worth of fines and court costs over the 18 months their site has been active. At the present rate, it is conceivable that photo installations at Wood Dale and Naperville could pay for themselves within three to four years. The reduction of the fine

and the choice to use community service as opposed to a cash fine will delay the time required to recover the construction and operating costs.

Preliminary indications suggest that automated enforcement is working well in deterring individuals from violating grade crossing warning devices. Violations at Irving Park Road have declined by 47 percent while violations at River Road have declined by 87 percent. Irving Park Road was experiencing three to four collisions per year prior to photo enforcement and has had only one collision in 13 months of operation. River Road, which was experiencing an average of two collisions every five years, has had no incidents since their site went into operation in July 2000.

Photo enforcement of traffic laws at grade crossings is an effective tool to reduce violations and collisions. While photo enforcement has proven its ability to deter violations, the current cost of the installations is a substantial impediment to their use statewide. In contrast, where applicable, median barriers at an average cost of about \$60 to \$70 per foot (or \$12,000 to \$14,000 for a typical crossing), are significantly less expensive than photo enforcement installations and can offer comparable effectiveness. Photo enforcement is likely to be implemented only at selected high-risk locations that have a history of collisions.

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